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ABSTRACT

An approach for developing examinations to assess the proficiency of health care professionals which utilizes a task inventory methodology is described. Examination development is based upon the identification of health care functions which individuals within a specific category of health professional should be skilled in performing. The several hundred entries in the task inventory are organized under headings that correspond to components of the clinical problem-solving process. A subsequent stage in this methodology provides for the assignment of relative priority ratings to these health care functions, so that those receiving a high priority undergo further analysis in order to serve as the basis for the development of examination materials. Priority ratings are determined by judgments regarding the expected frequency with which a health care function is performed and its "criticalness" to optimum health care delivery. Finally, the knowledge and skills components of each health care function receiving a high priority are specified and stated behaviorally. (Author/CK)

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Abstract

A METHODOLOGY FOR THE DEVELOPMENT OF EXAMINATIONS TO ASSESS THE PROFICIENCY OF HEALTH CARE PROFESSIONALS

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The development of examinations for health care professionals has long been based upon curricular content: the subject matter that is presented and the way in which its presentation is structured within the curriculum.

This paper describes an approach for developing examinations to assess the proficiency of health care professionals which utilizes instead a task inventory methodology. As a result, examination development is based upon the identification of health care functions which individuals within a specific category of health professional should be skilled in performing. The several hundred entries in the task inventory are organized under headings that correspond to components of the clinical problem-solving process.

A subsequent stage in this methodology provides for the assignment of relative priority ratings to these health care functions, so that those receiving a high priority undergo further analysis in order to serve as the basis for the development of examination materials. Priority ratings are determined by judgments regarding the expected frequency with which a health care function is performed and its criticalness to optimum health care delivery.

Finally, the knowledge and skills components of each health care function receiving a high priority are specified and stated behaviorally. These components become the performance criteria from which appropriate evaluation procedures are developed and minimum acceptable levels of proficiency are determined.

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A METHODOLOGY FOR THE DEVELOPMENT OF EXAMINATIONS TO ASSESS THE PROFICIENCY OF HEALTH CARE PROFESSIONALS

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Medical school faculties and external testing agencies share responsibility for evaluating whether individuals who are undergoing training or who have completed training have acquired requisite proficiency in carrying out those functions which constitute their role in the health care delivery system.

Whether the data from such evaluations are used to assess individual competence or the effectiveness of the training programs themselves, the usefulness of these data and the appropriateness of the decisions made on the basis of them, depend upon the extent to which the evaluations assess relevant aspects of proficiency and the accuracy and reliability with which this is done.

The purpose of this paper is to describe a methodology for the development of examinations designed to assess the proficiency of health care personnel. The work described herein was undertaken by the National Board of Medical Examiners as a part of its program to develop a national certifying examination for primary care physician's assistants.[2]

Major evaluations of individual proficiency usually occur at one or more key decision points along the continuum of training and experience. The data from these evaluations are used as a significant factor in deciding whether an individual can be allowed to enter a more advanced phase of training, or whether he has developed sufficient proficiency to allow him to assume a position of greater responsibility for health care delivery.

As was suggested earlier, a proficiency examination, if it is to provide useful data for decision-making, should be designed to assess those aspects of proficiency that are related to the health care functions in which a specific category of health professional needs to be skilled.

Components of Test Development

For this reason, the following factors were taken into consideration in developing the proficiency examinations for primary care physician's assistants:

1) What functions should this type of health care provider be skilled in carrying out?

2) What knowledge and skills are required in order to carry out each specific function?

3) What evaluation methodologies can be employed to assess the knowledge and skill components of the various health care functions?

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Issues to be Considered

Moreover, the following issues emerged, and needed to be effectively resolved:

1) Could consensus be reached concerning the health care functions a primary care physician's assistant should be skilled in performing?

2) What would be the effect of the identification of these functions on the development of the physician's assistant concept?

3) How would the limitations on time and resources available for evaluation effect the design of the proficiency examination itself?

Rationale

The difficulty of achieving consensus among experts in a field has often been viewed as a serious obstacle to the definition of the proficiency that a graduate of medical school or a residency training program should possess in order to effectively assume responsibility for patient care. As of this writing, there are some forty-one educational institutions training physician's assistants in curricula that vary from one to three years in length, and which accept students with diverse backgrounds in education and experience.

Since available task analysis studies of what functions physician's assistants actually perform are limited in scope and sampling techniques, and since the utilization of physician's assistants (P.A.) can be expected to reflect evolutionary changes for some time to come, it was felt that a methodology involving the judgments of experts in the field would be the most logical first step in identifying health care functions the P.A. should be skilled in performing. Moreover, since the P.A.'s proficiency would be viewed in terms of health care functions that constituted a body of "core" proficiencies, educational programs would continue to enjoy flexibility in the content and design of their curricula.

Task Inventory Study

In order to arrive at a consensus definition of the proficiency a primary care physician's assistant should be expected to possess, it was decided that the health care functions a P.A. needs to be skilled in performing should first be identified.

A review of existing task inventories concerning physician and non-physician health care providers was undertaken with the purpose of compiling a comprehensive list of health care functions.[3] As a result of this review, over eight hundred health care functions were identified.

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[3]The following resources provided the most useful task inventory data:

a) Golden, Archie S., and Johnson, Robert. A Task Inventory for Non-Physician Health Teams in Primary Care. The Center for Allied Health Careers and the Health Services Research and Development Center. The Johns Hopkins Medical Institutions, February, 1972.

b) Medex Program Patient Contact Record Feedback Report. Health Services Manpower Branch, National Center for Health Services Research and Development.

c) Physician Task Profile. Technomics, Inc., 1972.

In order to organize these functions for easy review by a group of experts, and to facilitate the addition of any health care functions not on the list but relevant to the physician's assistant, these several hundred entries were organized into a larger task inventory under the following headings:

I. DATA GATHERING

- A. HISTORY AND PATIENT RECORDS
- B. PHYSICAL EXAMINATION
- C. LABORATORY TESTS AND INVESTIGATIVE PROCEDURES
- D. PATIENT MONITORING

II. ANALYSIS AND INTERPRETATION

III. MEDICAL AND HEALTH CARE STRATEGIES

- A. EMERGENCY PROCEDURES
- B. SURGICAL PROCEDURES
- C. CLINICAL PROCEDURES
- D. MANAGEMENT AND THERAPY

A group of twenty experts (members of the National Board Advisory Committee on the Physician's Assistant) reviewed individually the task inventory of health care functions. These experts included physicians involved in the development of this new category of health care personnel, physician's assistants, physicians utilizing physician's assistants, physicians who train physician's assistants, and nurses concerned with the nurse practitioner concept.

A sample group of tasks and the four rating categories which were developed are provided in Table 1. Each of the experts was asked to read and consider each of the functions listed on the thirty-three page task inventory, and indicate by placing a check in the appropriate column to the right whether it was one the Type A primary care P.A. should definitely, probably, probably not, or definitely not be skilled in performing. (Since this examination was being developed to assess the proficiency of the Type A primary care physician's assistant, the conceptual definition of this type of P.A. developed by the National Academy of Sciences was used.)

A frequency distribution of the twenty judgments made concerning each health care function was compiled for all functions listed on the task inventory. Each of the four rating categories was given a numerical value on a scale of one to four: a value of four being assigned to the "definitely" category, and a value of one to the "definitely not" category. In turn, each judgment made by a rater was given a numerical value on the basis of the column into which a check had been placed.

The arithmetic mean of these judgments was then computed for each health care function. Those functions receiving a mean value of 3.50 - 4.00 were considered as ones that, in the view of expert opinion, a Type A primary care physician's assistant should definitely be skilled in performing. Functions receiving a mean value of 3.40 - 3.49 were reviewed by this expert group at a meeting during which the results of this task inventory study were presented.

As a result of this task inventory study, over five hundred health care functions were identified as ones the primary care physician's assistant should definitely be skilled in performing. The relatively large number of functions was due to the fact that each one was stated quite specifically rather than as a

Table 1

Example of Task Inventory Format with
Sample Functions within Selected Categories

	DEFINITELY	PROBABLY	PROBABLY NOT	DEFINITELY NOT
HISTORY AND PATIENT RECORDS:				
ask history since last illness				
write patient summaries				
PHYSICAL EXAMINATION:				
examine eyes using ophthalmoscope				
test reflexes				
LAB TESTS/INVESTIGATIVE PROCEDURES:				
perform white blood cell count				
determine urine pH, sugar, protein and specific gravity				
take throat culture				
initiate request for chest x-ray				

Table 2

Sample Task Inventory Entries and Format Used
in the Priority Study

	FREQUENCY				CRITICALNESS			
	high			low	high			low
EMERGENCY PROCEDURES:								
perform closed chest cardiac massage								
control external hemorrhage								
SURGICAL PROCEDURES:								
suture minor lacerations								
incise and drain abscess								
excise wart surgically								
CLINICAL PROCEDURES:								
apply and remove cast								
obtain an electrocardiogram								
COUNSELLING:								
counsel for growth and development								
explain venereal disease								

broad category. For example, the functions relating to history taking appear as eleven separate entries on the inventory, ranging from inquiring about the patient's chief complaint to conducting a review of systems. In a similar manner, wound care including suturing minor lacerations appears as four separate entries: cleanse, irrigate, debride, and suture minor lacerations.

It was felt that functions receiving a mean value of 2.50 - 3.40 (and judged to be ones the primary care physician's assistant should probably be skilled in performing) might well reflect areas in which training programs differed somewhat in their educational objectives as well as geographic variations in health care delivery. Since the examination was to be administered nationally, it seemed more appropriate for it to be designed to assess proficiencies that all primary care physician's assistants should possess.

In addition, the limitations of time and resources available for evaluation became the second major issue, and lead to the next phase of test development: a priority study.

Priority Study

A review of the health care functions identified from the task inventory study suggested that not all functions were equivalent in terms of their importance to the proficiency of the primary care physician's assistant. Moreover, the number of functions was so large that it was evident that no examination program could attempt to sample adequately the knowledge and skills related to all of them. For these reasons, a priority study was conducted using the same experts who had participated in the task inventory study, plus four additional experts, all of whom were pediatricians.

The purpose of the priority study was to establish the relative importance of the several hundred health care functions, so that those receiving the highest rating in this regard would serve as the primary focus for the development of examination for primary care physician's assistants.

Two dimensions were selected as the basis for determining the priority of each health care function: 1) the frequency with which this function might be carried out in a primary care practice, and 2) its "criticalness" to optimum health care delivery.

In order to determine the priorities of the more than five hundred functions identified from the first phase of test development, a second task inventory was prepared using the categories as listed on page three. The two dimensions which were to serve as the basis for arriving at these priority ratings (i.e., frequency and criticalness) were represented by two scales, each consisting of four intervals. The anchor points of each scale were labeled "high" and "low". Table 2 illustrates the format of the inventory used in this priority study.

Each member of the group of expert judges was asked to consider the functions included on this second inventory and to indicate how frequently he felt the task would be performed in a primary care practice and how critical it was to optimum health care delivery.

A frequency distribution of the judgments made regarding the frequency and criticalness of each health care function was compiled. A mean value for each health care function on each dimension was calculated by assigning a numerical value of 1 to 4 to the intervals on each scale as was done in the first task inventory study.

The priority value assigned to each health care function was determined by using the following formula: $P = \bar{f} + 2(\bar{c})$, where $\bar{f}$ is the mean frequency value and $\bar{c}$ is the mean criticalness value. The criticalness value was weighted more heavily than that of frequency because it was recognized that while some functions are performed infrequently (e.g., closed chest cardiac massage), they often involve life-and-death implications when they are required as a part of health care delivery. The use of the above formula resulted in a scale whose range was 3.00 - 12.00. Those functions receiving a priority value of 8.00 - 12.00 were further analyzed, in the manner described below, in order to serve as the basis for developing examination materials and evaluation procedures.

Specification of Performance Criteria

Since the validity of an examination as an assessment of proficiency depends upon its capacity to evaluate accurately the knowledge and skills required to carry out specific health care functions, test committees were appointed to analyze these health care functions and identify the knowledge and skills components related to each. These knowledge and skill components have been stated behaviorally to facilitate the selection of appropriate evaluation mechanisms and serve as the performance criteria to be used in assessing the proficiency of the P.A. Table 3 presents some of the criteria associated with the following health care functions: wound care; suturing lacerations; taking an electrocardiogram; applying a plaster cast; physical examination.

Table 3

Sample Criteria for Selected Health Care Functions

FUNCTION	CRITERIA
Wound Care	a) recognize normal signs associated with wound healing
	b) identify lacerations requiring primary closure by suture
Suturing Lacerations	a) select appropriate suture material
	b) effect a closure in which all dead space has been obliterated
Electrocardiogram	a) identify the correct placement of all V leads
	b) select appropriate courses of action to eliminate or minimize technical defects in an EKG tracing
Cast Application	a) identify the correct position of functions for applying a forearm cast
	b) recognize errors made in cast application
Physical Examination	a) recognize and name common skin lesions
	b) recognize and describe abnormalities seen on funduscopic examination

The methodology described in this paper would appear to be applicable to any evaluation effort designed to assess the extent to which individuals have acquired necessary proficiency in carrying out specified health care functions. Although it was used here to assess the proficiency of physician's assistants, this methodology could also be utilized at various points along the continuum of medical education for physicians and other health care professionals as a means of evaluating progress in attaining educational objectives.